84[A, F].—M. Lal, *Expansion of* $\sqrt{3}$ *to* 19600 *Decimals*, Memorial University of Newfoundland, St. John's, Newfoundland, Canada, ms. of 2 typewritten pp. + computer printed table, deposited in UMT file.

The result here is very similar to Lal's previous work on $\sqrt{2}$. (See UMT **17**, this volume of *Math. Comp.*, for a detailed review of that computation.) The method, computer, and computation time here are the same as in the previous computation. Each of 19 blocks of 1000 digits has a decimal-digit count and an evaluated χ^2 to 2D. The distribution appears to be random.

Lal's decimal-digit count for $\sqrt{3}$ at 14000D agrees with that of Takahashi & Sibuya (UMT **18**, this volume). His digits 13901–14000 also were checked against theirs and complete agreement was found.

D. S.

85[F, J].—D. E. Knuth & T. J. Buckholtz, *Tables of Tangent Numbers, Euler Numbers, and Bernoulli Numbers*, California Institute of Technology, Pasadena, California, January 1967, ms. of 311 computer sheets (unnumbered), 28 cm., deposited in the UMT file.

The first part of this manuscript consists of a 95-page table of the exact values of the first 404 Euler numbers, designated E_{2n} and taken here as all positive. The most extensive table of these numbers previously calculated appears to be that of Joffe [1], consisting of 50 entries, reproduced by Davis [2].

The remaining table in this manuscript is a 216-page compilation of the first 418 tangent numbers and corresponding numbers C_{2n}, for $n = 1(1)418$, from which the nonvanishing Bernoulli numbers can be obtained by the relation $B_{2n} = C_{2n} - \sum 1/p$, where the sum is taken over all primes p such that $(p - 1) | 2n$, by virtue of the von Staudt-Clausen theorem. These primes are listed with each C_{2n}.

The tangent numbers, designated T_{2n-1} by the present authors, are integers defined by the Maclaurin expansion

$$\tan x = \sum_{n=1}^{\infty} T_{2n-1} x^{2n-1}/(2n-1)!\,, \qquad |x| < \frac{\pi}{2},$$

and are, accordingly, related to the Bernoulli numbers by the formula

$$(-1)^{n+1} T_{2n-1} = 2^{2n}(2^{2n} - 1) B_{2n}/(2n)\,.$$

Previous tabulations of the exact values of T_{2n-1} and B_{2n} extend to at most $n = 30$ and $n = 110$, respectively [3], [4].

The calculations underlying the present tables constitute an extension of similar calculations of Bernoulli numbers carried out by Dr. Knuth in the course of his evaluation [5] of Euler's constant on a Burroughs 220 system. The present calculations, on the other hand, were performed on an IBM 7094 system, in a total running time of approximately 25 minutes. Further details of the method of calculation of these tables are set forth in a paper [6] appearing elsewhere in this journal.

J. W. W.